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BULGARIA

IZOT MINICOMPUTER SYSTEM SPECIFIED

Sofia RADIO, TELEVIZIYA, ELEKTRONIKA in Bulgarian No 6, 1976 pp 18-20

[Article by Scientific Associate Engineer Z. Zakhariev, IIT: "The IZOT 0310 System"]

[Text] The IZOT 0310 system is the first Bulgarian minicomputer system developed by the IIT [expansion unknown]. It is being serially produced as of 1976 at the Elektronika plant in Sofia. It is designed to meet the needs of the mass consumer in the solution of a broad range of information-logical, scientific-technical and economic problems of small or average size, as well as the control and automation of production processes within a factual time scale, serve complex communication oriented systems, and provide training in various fields of medicine.

The comprehensive application of the IZOT 0310 system is provided by the following:

A system of instructions containing a broad range of logical instructions and operations with a fixed point;

A standard interface which enables us to link a large number of peripheral systems with various characteristics into the system;

A design based on the modular principle which provides for high flexibility, reliability, and repair suitability of the system;

A developed program support;

Existence of high capacity external memory systems (VZU), quickly accessible, considerably broadening the possibilities of the internal processor memory.

The IZOT 0310 system could operate in a remote control processing and multiple processor system regiments in the presence of suitable

apparatus and program facilities. It could be used for computing and documentary operations in the following areas:

Industry: automation and control of production processes;

Scientific research and design institutes: solution of a variety of scientific and technical problems;

Medicine: the creation of respective apparatus and program facilities;

Training;

Administrative and state management: primary data processing;

Economics: development of small type ASU [automated control systems] of primary data processing;

Industrial data gathering (information-dispatcher systems).

The IZOT 0310 system is based on domestic studies of computer systems and computer system components. Some of its components have been developed in Bulgaria, while others are purchased from socialist countries.

IZOT 0310 may replace systems of the following type:

M6000 -- USSR; MEPA 100, 200, 300 -- Poland;

TPAI/1001 -- Hungary;

PDP 8L and 8E -- United States;

DATA NOVA 1200 -- United States;

VARIAN 620 -- United States;

WANG -- United States.

This enumeration covers only systems thus far imported by Bulgaria. However, IZOT 0310 could replace all general purpose minicomputer systems.

System Technical Data, Characteristics and Features

Central processor -- IZOT 0310 (photograph given):

Number of addresses -- single-address code

Arithmetic type -- parallel to complement code

Control principle -- odd

Guidance principle -- circuit

Time for obeying a one-cycle instruction -- 2 μs

Basic information unit -- 12 digit bit

Index registers -- 8

Working memory:

Volume -- 8 k words

Bits -- 12 + 1 bit for control

Cycle -- 2 μs

Access time -- 0.8 μs

Type -- ferrite

Memory protection -- based on last page notation

Number of instructions used -- about 242

Maximal number of addressible control systems -- no more than 64

Organization of link with peripheral region -- channel

Number of channels -- 2

Multiplex channel -- 110 k words/s

Selector channel -- 500 k words/s

Priority levels -- no more than 64

Consumed power -- 750 VA

Technical characteristics:

Data processing organization.

The processor has a main structure. The data processing must be concentrated in the arithmetical-logical block while its movement is organized through its two input and one output mains. The memory

(regenerating) may operate simultaneously with the data processing in the arithmetical-logical block.

Information format: 12 digit bit word of fixed length. Accuracy may be improved in the utilization of two or more program-linked words.

Addressing: A word is the smallest addressible unit. Word addressing from the current and zero page is direct; it is indirect for a random word from the other pages. Use of 8 index registers makes indexing and self-indexing possible.

Instruction system: of the overall number (about 200), 6 are basic, resorting to the memory, while 20 are operational without resorting to the memory, while the remaining are for input-output operations.

Arithmetical operations: it is necessary to have arithmetical operations including binary numbers with a fixed point, with a range from -1 to 1• + . The operations should include addition and subtraction. Multiplication and division are programed.

Registers:

AK -- accumulator (accumulating register for arithmetical and logical operations), 12 digit;

TPR -- one bit is the accumulator overflow indicator;

BI -- instruction counter, 12 digit;

AR -- address register, 12 digit;

BR -- buffer register (information register for memory recording), 12 digit;

RCh -- number register read by the working memory, 12 digit;

RI -- instruction register, 3 digit;

IR -- index registers -- 8;

PR -- panel register for manual input, 12 digit.

The condition of the address, buffer and accumulating registers is indicated on the engineering panel.

A circuit breaker system is used.

The organization of input-output operations -- data exchange with peripheral systems -- takes place with the help of a channel organization

and standard interface, making possible standard dialogues and data exchange with a large number of varied peripheral systems. The link between the channel and the specific data carriers (peripheral systems) is achieved with guidance systems which, on the one hand, engage in standard dialogues and data exchange with the channel, and on the other, implement the specific guidance for individual periphery systems. There are two type channels:

For work with peripheral systems, with a relatively small and medium data transmission speed (multiplex channel);

For work with peripheral systems with a relatively high data transmission speed (gate channel).

The multiplex channel may work with slow medium speed peripheral systems, mainly group or single, with the possibility for 64 priority levels.

The gate channel works with high speed systems. It is relatively independent of the remaining central memory bank systems and operates within a system occupying one cycle of the working memory for particularly fast peripheral systems or 3 cycles (for slower peripheral systems). The memory shield is based on the entry on the last page by the working memory.

With the help of Module 2, the working memory could be expanded from 8 to 32 k words in 4 k word-blocks, depending on user requirements.

Operations panel -- teletype ASR 33, consisting of:

An input and output letter-digit printing system;

A slow punched tape reader;

Slow tape punch.

The guiding system for all three systems is located on a separate card in Module 1.

Letter-digit printing system:

Print type -- letter-digit

Print speed -- 10 symbols per second

Number of symbols per line -- 72

Number of printed symbols -- 72

Number of copies -- 2

Basic line interval -- one-half millimeter

Number of keys -- 52

Information code -- AS II

Slow tape punch:

Punch speed -- 10 lines per second

Information carrier -- 5 to 8 track tape

Punching principle -- electromechanical

Slow punched tape reader:

Input speed -- 10 lines per second

Information carrier -- 5 to 8 track tape

Reading principle -- electromechanical

Power used -- 500 VA

Fast tape input system FS 1501:

Maximal input speed 1500 lines per second

Information carrier -- 5 to 8 track tape

Tape run after stopping at full speed -- no more than 1.5 millimeters

Reading principle -- photoelectric

Number of tracks -- 8 + synchrotrack

Power used -- no more than 200 VA

The guidance system of the FS 1501 is located in Module 1 on a separate card.

D102 fast tape extraction system:

Maximal punch speed -- minimum 90 signs per second.

Information carrier -- 5 to 8 track tape

Punching principle -- electromechanical

Power used -- 500 VA.

The guiding D102 system is in Module 1 and located on a separate plate.

Minimemory magnetic disc control structure (MZUMD) IZOT 1370 -- Module 3:

Number of linked MZUMD -- 4 or less

Control principle -- circuit

Control method -- cyclical

Speed of exchange with TsP -- 208 k words per second

Organization of exchange with the TsP -- 1 cycle.

Length of buffer word -- 12 bits

Power used -- 160 VA

Type of recording -- NRZ with double frequency.

IZOT 1370 is a one-channel system with a 16-sector recording organization and the possibility for data transfer only through the selector channel (with direct access to OP of the TsP), removing one work cycle of the TsP each 4.8 μs for transferring the completed word from/to the TsP or to/from the control system.

Minimemory machine disc system (MZUMD) IZOT 1370:

Recording method -- NPZ with double frequency

Volume of information recorded -- 50 M bit (3.2 M words)

No of cylinders -- 200 + 3

Number of surfaces -- 4

Number of sectors -- 16

Maximal access time -- 80 ms

Minimal access time -- 14 ms

Average access time -- 45 ms

Average waiting time -- 12 ms

Speed of data exchange -- 2.5 MHz

Number of heads -- 4

Number of replaced cassettes -- 1

Number of fixed plates -- 1

Recording density -- 90 bit/mm

Accuracy -- 5.10^{-9}

Rotation speed of disc packet -- 2400 rpm $\pm$ 1 percent

Power used -- 400 VA

The system records and reads the data from a replaceable disc ES 5269 or IBM 5440 type or their equivalent, placed from the top. It also has a nonreplaceable cassette. It performs the operations of scanning, recording, and reading. It has flying reading heads positioned with an electrodynamic linear motor.

The positioning system uses an electromagnetic reader and an electronic servosystem which keeps the heads along the given address.

The mobile and fixing discs are located on a common shaft linked to the axle of the D.C. motor. Filtered air is fed to the disc.

The system has an interface compatible with DIABLO 43.

Minimemory system control with magnetic tape IZOT 0310 (Module 4):

Maximal number of connected ZUML -- 4 or less

Recording and reading method -- NRZ - 1

Guidance method -- circuit

Control method -- cyclical

Recording density -- 32 bits per millimeter

Exchange speed -- 10, 20, 30, 36 k words/s

Speed controlled tapes -- 32, 64, 95 and 214 cm/s

Consumed power -- 160 VA

The system may operate linked with the selector channel of Module 1 with a choice of system taking 1 or 3 OP cycles. It is adapted for the use

of minitapes of the IZOT 5003, IZOT 5006, and other types with equivalent interface and characteristics.

Minimemory system of magnetic tape MZUML IZOT 5003:

Information exchange speed -- 10 bit/s

Recording density -- 8 bit/mm

Accuracy of recorded information -- 10^{-8} level

Recording method -- NRZ-1

Recording format:

Number of tracks -- 9

Zone interval:

Reading -- 12.6 millimeters

Recording -- 15.2 millimeters

Cassette diameter -- 216 millimeters

Nominal motion speed -- 32 cm/s

Motion speed in rewinding -- 190 cm/s

Moment speed imbalance -- $\leq$ 3 percent

General speed unevenness -- $\pm$ 2 percent

Start stop time -- $<$ 28 ms

Correspondence with ISO-P1863

Consumed power -- 240 VA

Control system of a letter-digit mosaic printer and reader from IZOT 0310 punch cards Module 6:

1. System for controlling wide mosaic print with 2 working systems -- start stop and continuous.

Printing speed -- no less than 150 symbols per second

Number of guiding bars between the guiding and peripheral systems -- no more than 8

Buffer length -- 12 bit

Data exchange between the TsP and guidance system follows a channel for program controlled data exchange

2. Guidance system of punch card reader:

Input speed -- over 250 cards per second

Information carrier -- 80 columns, 12 position cards

Reading stroke -- 1

Reading principle -- photoelectric

Card filling method -- column

Feeding cartridge volume -- 600 cards

Consumed power -- 150 VA

Big letter-digit mosaic print system -- DZM-180

Printing speed:

From 50 to 60 lines per minute at 10 symbols/"

From 45 to 55 lines per minute at 12 symbols/"

Code -- 7 bit ISO

Consumed power -- 250 VA

The feeding of all systems comes from a single phase circuit with a frequency of $\pm$ 1 Hz and a tension of 220 V + 10 percent -15 percent.

The program support of the system -- the IZOT 0310 system -- is supplied with a POS punched tape and a DOS operational system and is planned for a library of standard and other programs.

5003
CSO: 2202

SCIENCE ACADEMY PRESIDENT STRESSES BASIC RESEARCH NEEDS

East Berlin SPEKTRUM in German Jun 76 pp 5-9

[Interview with Academy President and Academician Herman Klare by Hildegard Hesse]

> [Text] Activity review between two party congresses. Excerpt from Erich Honecker's Report to Ninth SED Congress: "The development of science and technology and the improvement of the people's living standard have already become a uniform, inseparable process. One can say that a high level of scientific-technical achievement embodies a fundamental social need of our entire forward development. It is precisely from this viewpoint that our party does everything in an effort to speed up the development of science and technology in the GDR, side by side with the Soviet Union, in the interest of the people and to utilize this development with a high degree of effectiveness for the sake of society."

Question: Mr. President, at the Ninth Party Congress you reported on the results of the Academy's research between the two party congresses. In addition to the results in the natural sciences and in the social sciences, you mentioned development tendencies which have enhanced the capacity and the social usefulness of basic research. Since our conversation if possible is not to be a repetition of what has been said before, we would like to ask you just one question on that score: What must be emphasized when we speak of progress in the Academy's scientific work?

Professor Klare: The Academy's development between the two party congresses, in my view, can be gauged by the way in which--together with the colleges and technical schools--it discharged its responsibility for the direction, planning and coordination of basic research. In this connection I would like to emphasize the following:

1. The concept on the long-term development of basic research is the result of a joint effort by the college system and the Academy which, together, combine the main portion of our Republic's basic research potential. I believe that the college system and the Academy have thus achieved a

common effort in terms of planning and research which was of great benefit to the intensity and effectiveness of our work.

2. The concept regarding the long-term development of basic research until 1990 was coordinated with the Academy of Sciences USSR. The Soviet Academy has our concept and we obtained the main directions in the Soviet Academy's natural science and social science research so that we were able mutually to coordinate our joint undertakings in long-range terms with a view to division of labor. The friendly relations between our two academies have never before been as close and full of confidence in their common 250-year history. Just recently, we had a conference with President Aleksandrov on research strategy questions and that once again showed us clearly on what a stable foundation the science of the socialist countries actually stands. The science of the socialist countries has the necessary capacity for making a decisive contribution to the dispute between socialism and imperialism and to the achievement of detente through wise concentration on its common tasks.

3. The long-term basic research development concept was furthermore coordinated with the long-term science and technology plan of the GDR until 1990. This means that an extraordinarily important prerequisite has been created for closely tying scientific lead time in with scientific-technological progress.

The 1976-1980 five-year plan for basic research will show how we manage to utilize that advantage. Our scientists must be successful in translating the objectives and tasks in the program and main research directions, such as they are listed in the concept, into the dynamic development of our society, the resultant specific need, and, last but not least, they must do justice to progress in science as such.

With regard to research I would only like to say this much: since the Eighth Party Congress, we have had an increase in the achievements of most of the natural science and mathematical discipline; there has been an increase in the theoretical permeation of the various fields of science; and it has been possible to develop research methods further. In the social sciences likewise we can observe quantitatively and qualitatively higher achievements; that was attained primarily due to the concentration of the ablest scientists on the critical tasks in the central research plan. The Academy's activity report on the 1970-1975 five-year plan is now available and it shows that all parts of this plan have been fulfilled.

Since I do not want to repeat here everything I said at the party congress, I would like to make reference in this connection to the articles by the research sector chiefs which were published by SPEKTRUM during the last half year. Taken together, they very clearly illustrate how the science policy of the SED was carried out in the Academy.

There is one thing that I like particularly in these evaluations and that is their partly rather critical note: they show not only what we did manage to do but they also show what we have not yet attained. The higher requirements for science, which were adopted by the Ninth Party Congress, obligate all of us to draw the necessary conclusions from that and to translate all this into practical research activities.

Question: The period of probation of the current Academy management is due to end on this coming traditional Leibniz Day. We believe that this occasion would justify a review of past activities which would once again clearly show how our facility has developed with regard to the Socialist Research Academy. In short, what are most essential changes in the Academy after the so-called "Academy Reform" was launched 8 years ago?

Professor Klare: Although brevity might indicate some unpardonable restrictions, I want nevertheless to mention only those changes which concern the organization and the assignments of research, the structure, and the management of the Academy. First of all it was necessary to establish and improve the unity of the Academy as a research institution and as a society of learned men. The model represented by the Academy of Sciences USSR was a big help to us here. It was also necessary for our institution to go much more into basic research and at the same time to draft research assignments which would solve the decisive problem involved in the further development of socialist society. The party and the government were justified in demanding that our scientists set themselves complex tasks which lead into the future but from which one could also derive results for utilization by society. The latter means nothing more than to integrate the research potential of the Academy of Sciences into the social reproduction process. We had to exploit our advantage--represented by the fact that we have almost all science disciplines in our Institute--that is to say, we had to engage in fundamental research with new creative ideas and, if possible, we had to develop them further into results and technological processes which could be utilized in the national economy. All this was tied to the need for making science cooperation, primarily with the Soviet Academy, but also with the academies of the other socialist countries, more and more effective, also along the lines of division of labor. Closely tied to the scientific-prognostic work of the Academy was the urgent need to enhance the effectiveness of the plenum and the classes beyond the Academy's framework. This is why the assignments for both bodies had to be revised and this is why it was also necessary to promote cooperation between natural and social scientists.

Question: Your answer contains a whole program? Was it difficult to carry it out?

Professor Klare: We should not measure such development processes according to degrees of difficulty. The important thing is the outcome. We realized clearly from the very beginning that the Academy's place in our society could not be derived from tradition alone and had to be proved not only by mere claim but also through its achievements. Of course, making these discoveries clear to all scientists and staff members did involve some disputes and difficulties. But I consider that natural because anything that is new, as we know, always prevails only through a dispute of opinion.

Let me perhaps say a few words about something that all of us had to grasp before we could meet society's demands: We had to develop forms of research

management and planning which would assure our success; we had to put together research profiles, we had to spell out tasks on the basis of social requirements and we had to utilize our potential in a correspondingly concentrated fashion; using the incorruptible criterion of research results, we had to examine again and again whether the Academy meets social requirements; we had to create prerequisites which would make it possible for us to develop research cooperation with the USSR and the other socialist countries along the lines of division of labor. Numerous conferences within the presidium but also in the plenum provided clarification on these basic issues regarding which there were differing views and many scientific disputes were also connected with the science-prognosis activity of the Academy.

Question: What were the consequences of this activity as regards the formation of scientific opinion at the Academy?

Professor Klare: First of all, it resulted in considerably higher requirements for scientific opinion formation--and, I would like to add--decision-making, because the results had to contain well-founded, farreaching prognostic statments worthy of the Academy. It was just as obvious as it was well justified that our socialist society expected the Academy to make a decisive contribution to the implementation of the resolutions of the Eighth Party Congress. That called not only for corresponding research results. That also included strategic orientations for the long-term development of natural science, mathematical, and technological disciplines, for the development of basic research in terms of content and method. The numerous prognoses, which were prepared at the Academy at the end of the sixties, were the result of interdisciplinary cooperation which at the same time gave us valuable experiences for long-term research planning and for differentiated work on basic concepts. This activity also includes those concepts and decision-making foundations regarding main directions and main points of research which we worked out for the party and government leadership.

Here we might emphasize the share of the plenum and the classes in the accomplishment of these tasks. For example, our plenum--which after all represents the unity of the Academy--in recent years discussed not only new research results or scientific problems. It also adopted positions on basic issues of community life. The classes increasingly turned toward fundamental science problems and across-the-board questions. Moreover, they also concerned themselves with such current problems which concern scientific-technological progress, the protection and fashioning of our environment, and the development of research areas important to the national economy. As agencies for scientific opinion formation, the classes embody a science potential which promotes the integration of the disciplines. That was and is an advantage to the clarification of complex problems which touch both areas in science and areas in community life.

Question: You said at one time that the combination of science and production is presently impaired primarily by the development of science fields and industry branches which is not always and everywhere proportional. What conclusions are drawn from that?

Professor Klare: It is very important for us to do an even better job in coordinating our research with the partners in industry and in other social sectors. During the last five-year plan, we did make progress in the faster transposition of research results into practice (through better agreement between goal and task assignments in terms of content, through an ever higher level of planning in production cooperation relations and through the higher sense of responsibility of the scientists); we nevertheless find that the social effectiveness of our research must be increased further. The preparations of the Ninth Party Congress and the congress itself showed us very compellingly what great significance is assigned to basic research in our society. In the light of the party congress I would like to point to those passages in the activity report in which Comrade Erich Honecker emphasized the growing responsibility, the constantly rising influence of science, its significance, and its application in terms of the interests and needs of socialist society. In close interconnection with applied research and technological development, basic research must make a constantly growing contribution to the planned perfection of production.

This justified requirement is still hindered by obstacles which make it difficult to transpose research results into practice or which delay such transposition or make it impossible. In my opinion, we will come closer to the solution of these problems only if, in the future, we achieve even better agreement between the development of the sciences, as spelled out in the plan, and the planned development of the economy branches. In greatly simplified terms that would mean that we would have to bring about agreement between the developing scientific results and investment planning.

Naturally, we must not forget our own weak points. The critical contemplation of that after all played a big role at the kreis delegate conference and I covered that also in the January issue of SPEKTRUM. The development level, which the Academy has attained, once again confirms the correctness of the party's and the government's science policy. But we also knew that the Academy's social responsibility and obligation will grow. That is reason enough for soberly contemplating what we have achieved and again and again trying to explore where we must step up our efforts. In the previously mentioned issue of SPEKTRUM, I made a few remarks on that and they are still timely. My remarks concerned the solution of original scientific problems which create a headstart for further developed or new process techniques; my remarks related to complex solutions with an economic benefit on the order of the national economy as a whole--solutions which are still entirely too rare; my remarks also concerned the objectivity and critical atmosphere of our scientific debates with which we cannot yet be satisfied. I believe that the conclusions deriving from that concern all of us to some extent. The Academy's future responsibility, spelled out so emphatically in Erich Honecker's activity report, will determine our actions. Built on what we have achieved so far, we must look for entirely new solutions in order to strengthen the energy and raw material base, to develop the consumer goods industry, to promote the construction of plant and installations, the construction industry, the communications industry, medicine, as well as agriculture, forestry, and the essential foods industry--and we must absolutely find those new solutions.

Question: Higher requirements for the organization and management of Academy research are of course also connected with this higher requirement for basic research, is that not so?

Professor Klare: You are right. The responsibility of the management team grows along with the justified demand that we step up our achievements. Management tasks are becoming more complicated and demand a deep insight into scientific problems as such. Science organization thus, to an ever increasing degree, becomes a necessary prerequisite for the solution of problems.

Important criteria for the success of our work are represented by the scientific content and standing of our research undertakings which we should not measure by what we ourselves can do at the particular moment but by what the scientifically most advanced institutions in the world are capable of doing, for example, our sister academies.

Regarding the practical effectiveness of our research results, we must also get away from the ideology of individual examples. By that I mean that--instead of a broadly-designed research effort, which is quite consciously aimed at the satisfaction of important social needs--we are being oriented merely toward a narrow result of successful application.

A well balanced relationship between thematic and methodological research is also of basic significance to all research programs. Both sides constitute an inseparable unit because thematic progress is often possible only through methodological further development. The scientists must more strongly discharge their responsibility for the methodological development of their research subjects because this in turn creates important prerequisites for original problem solutions.

Question: You keep emphasizing that the Academy can develop further only if it is possible to develop creative socialist scientist personalities.

Professor Klare: I am convinced of that but I also know that some aspects of this view are disputed; scientist circles sometimes advocate the opinion that instruments and equipment should have primacy. In my opinion, that is not quite right because the development of a high theoretical and experimental level in research always has its origin in the knowledge, the ability, the profound thinking and, last but not least, also the creative intuition of individuals. It is part of the craft and the ability of the scientist that he know how to utilize a modern set of instruments to the advantage of his research activity. Regardless of what I have just said however I am entirely in agreement with President Aleksandrov when he emphasizes the following:

"In the natural sciences and, most recent, also in the social sciences, the productivity and quality of work depend decisively on how research is equipped with modern, highly-productive, automated laboratory equipment and computers. Great results today are no longer possible if one works with obsolute instruments."

It is precisely this statement which after all implies that the requirements for intellectual abilities grow, that there must be a higher measure of knowledge, ability, and ethics because the qualitative factors are moved to the foreground as compared to the quantitative ones.

It is furthermore my view that, nowadays and especially during the very near future, such characteristics as diligence, imagination, intuition, the desire to discover, the striving for success, and healthy ambition, on the part of scientists, will no longer be sufficient in research. More than ever before, they must be on a reliable, uniform, ideological-Marxist foundation which will impart to the collectives and to the individual personalities the attitude which--in any situation--will mark them as educated socialist individuals. This includes empathy, teamwork, modesty, and an understanding for the worries of others as well as the realization as to how much the exemplary attitude depends on partisan support for the cause of socialism.

The activity report to the Ninth Party Congress emphasized and paid tribute to the work of the Academy. In the name of all Academy members and collaborators I was able to express appreciation for this and also to say that we are proud of these achievements. This appreciation however obligates all of us to display proper modesty--because very much more is expected of us and we face higher requirements.

5058
CSO: 2302

ENGINEERS OF UNITED INCANDESCENT CALL FOR GRADUALISM IN IC PRODUCTION

Budapest FIGYELO in Hungarian 15 Sep 76 p 13

/Summary/ An article in a recent issue of FIGYELO states that a modern economy cannot do without digital technology. It adds, however, that production of the "supercomplex" integrated circuits required for this in Hungary is inconceivable without the thorough regrouping of industrial resources. Such a regrouping is not out of question, but it is worth considering whether or not the economy can be provided with this technology through import or some kind of international cooperation.

The aforementioned article assigns too great a role to microprocessors. In our opinion microprocessors are merely a very practical systems technology solution in one area of applications. The microprocessor is primarily a systems technology trend and not semiconductor technology as it is sometimes erroneously taken to be. There can be no question of their /microprocessors/ satisfying extensive industrial demand. This is why we say that microelectronic technologies must be developed in such a way that they will meet mass industrial demand whether in the field of digital or analogue circuitry.

The extent to which the development of our microelectronic technologies can depend on domestic research facilities, what opportunity there is for international cooperation or the purchase of the technical know-how or production equipment from advanced factories is quite another matter. Yet another question is the price at which will be possible to buy supercomplex integrated circuits on the international market by the time domestic production begins and how this price will relate to production costs.

United Incandescent feels that the following logical step is establishment of mass production of "highly complex" integrated circuits. It has already taken the steps needed for this, and production will begin in 1977. Arrangements for adoption of some technology required to produce supercomplex integrated circuits cannot be made till after then. Up to that time the theme should be the subject of thorough domestic research, and this is now in progress. The industry should not permit itself to be carried away with the idea of microprocessor.

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